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**CITY OF GARDEN GROVE
GENERAL PLAN**

CONSERVATION ELEMENT



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GENERAL PLAN**

CONSERVATION ELEMENT

City planning Garden Grove
Conservation Water " "
water treatment " "



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Preface

On January 22, 1974 the Garden Grove City Council adopted the Conservation Element of the City's General Plan in compliance with State requirements and with the City's desire to systematically update the entire General Plan. The Conservation Element concerns itself with the conservation of the City's water resources as it deals with the quality and quantity of water in the community, maintaining a safe and healthy environment through the proper disposal of the City's waste water, and providing adequate flood control facilities.

Acknowledgements

We wish to express appreciation to the Orange County Flood Control District, Garden Grove Sanitary District, Garden Grove Water Department, Santa Ana Watershed Planning Agency, Orange County Water District, Metropolitan Water District, and the County Sanitation Districts of Orange County for their cooperation and valuable contributions toward the preparation of the Conservation Element.

Prepared by the
Urban Development Department
City of Garden Grove
11391 Acacia Parkway
Garden Grove, CA 92640

RESOLUTION NO. 2693

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF GARDEN GROVE RECOMMENDING THE APPROVAL OF THE PROPOSED CONSERVATION ELEMENT OF THE CITY GENERAL PLAN.

WHEREAS, on June 13, 1972 the City Council of the City of Garden Grove directed staff to begin a systematic update of the City's General Plan; and

WHEREAS, the Garden Grove Municipal Code, Section 2.24.100 provides in part that the Planning Commission shall develop and maintain the comprehensive general plan for the city consistent with good environmental, economic, and social planning practices and shall develop plans, policies and standards for the comprehensive planning, regulation and development of land uses consistent with the goals of the city; and

WHEREAS, pursuant to Section 65302 of the Government Code, each city shall adopt a conservation element by January 1, 1974; and

WHEREAS, a conservation element of an urban general plan deals with the provision of a safe water supply and adequate drainage and sanitation for the community; and

WHEREAS, on December 13, 1973 the Planning Commission of the City of Garden Grove reviewed the proposed Conservation Element for the City; and

WHEREAS, in the matter of the proposed Conservation Element of the City's General Plan the Planning Commission of the City of Garden Grove does report as follows:

1. The subject case was initiated by the City of Garden Grove pursuant to Section 65350 et seq. of the Government Code.
2. The applicant requests the review and recommendation of the proposed Conservation Element.

3. The Staff Report and environmental impact report submitted by the City's Staff were reviewed.
4. Pursuant to Legal Notice, a public hearing was held on the subject proposal and Environmental Impact Report, and all interested persons were given an opportunity to be heard.
5. The Planning Commission gave due and careful consideration to the matter during their meeting of December 13, 1973; and

WHEREAS, facts and reasons supporting the conclusions of the Planning Commission as required under Municipal Code Section 9220.4 are as follows:

1. The proposed Conservation Element makes provisions for ensuring a safe water supply and adequate sanitation and flood control facilities by establishing long-range objectives, standards, and programs for conserving and protecting the City's water resources.
2. The proposed Conservation Element provides a guide for the implementation of the adopted Growth Policy Element in that it establishes specific standards and principles regarding water resources that will best serve the interest of the citizens of Garden Grove.
3. The proposed Conservation Element of the General Plan complies with the State law regarding conservation elements in that it provides for:
 - a) the conservation, development, and utilization of water resources.

- b) coordination with countywide water agencies and with district and city agencies which have developed, served, controlled, or conserved water for any purpose for the City of Garden Grove.

WHEREAS, the Planning Commission does conclude:

1. That the proposed Conservation Element of the General Plan provides sound planning principles to ensure the continued provision of a safe water supply and adequate drainage and sanitation facilities.
2. That the proposed Conservation Element generally reflects the needs, desires, and aspirations of the citizens of Garden Grove.
3. That the proposed Conservation Element as presented by the City Staff, dated October 30, 1973 does possess characteristics that would indicate justification for a recommendation by the Planning Commission to the City Council of the City of Garden Grove for adoption of the proposed Conservation Element; and

WHEREAS, since the implementation of the proposed Conservation Element could have a significant impact on the environment of Garden Grove, a full environmental impact report was prepared; and

WHEREAS, the environmental impact report indicated that it would be environmentally advantageous to implement the proposed Conservation Element.

NOW THEREFORE, BE IT RESOLVED that pursuant to Section 2.24.100 of the Municipal Code, the Planning Commission of the City of Garden Grove does hereby recommend to the General Plan dated October 30, 1973.

ADOPTED this 13th day of December, 1973.

/s/ R. B. Finch
CHAIRMAN

I HEREBY CERTIFY that the foregoing resolution was duly adopted at a regular meeting of the Planning Commission of the City of Garden Grove which was held on December 13, 1973, and carried by the following vote:

AYES: COMMISSIONERS: JENNINGS, McNAMARA,
PEET, SHELSTAD,
SLIMMER, FINCH
NOES: COMMISSIONERS: NONE
ABSENT: COMMISSIONERS: SHELTON

/s/ Norene Sherrad
CLERK OF THE PLANNING AGENCY

RESOLUTION NO. 4526-74

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF GARDEN GROVE ADOPTING THE CONSERVATION ELEMENT OF THE CITY GENERAL PLAN AND THE ENVIRONMENTAL IMPACT REPORT ON THE CONSERVATION ELEMENT.

WHEREAS, on June 13, 1972, the City Council of the City of Garden Grove directed Staff to begin a systematic update of the City's General Plan; and

WHEREAS, California Government Code Section 65302 et seq. requires in part that a General Plan shall include a Conservation Element; and

WHEREAS, pursuant to Section 2.24.100 of the Municipal Code, the Planning Commission shall develop and maintain a comprehensive General Plan for the City of Garden Grove; and

WHEREAS, on December 13, 1973, a public hearing was held before the Planning Commission of the City of Garden Grove to review the proposed Conservation Element; and

WHEREAS, after due consideration the Planning Commission recommended approval of the proposed Conservation Element and adopted by Resolution No. 2693 with specific facts and reasons supporting their conclusion as required by Section 9220.4 of the Municipal Code; and

WHEREAS, the City Council of the City of Garden Grove conducted a public hearing and gave due and careful consideration to the matter on January 15, 1974;

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Garden Grove does hereby adopt the proposed Conservation Element of the City General Plan and the Environmental Impact Report on the Conservation Element for the reasons stated in Resolution No. 2693 of the City of Garden Grove Planning Commission which, along with said resolution, are specifically incorporated herein by reference.

ADOPTED this 22nd day of January 1974.

/s/ BERNARD C. ADAMS
MAYOR

ATTEST:

/s/ RUBY K. SILVA
CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF ORANGE) SS:
CITY OF GARDEN GROVE)

I, RUBY K. SILVA, City Clerk of the City of Garden Grove, do hereby certify that the foregoing Resolution was duly adopted by the Council of the City of Garden Grove, California at a regular meeting thereof held on the 22nd day of January, 1974, by the following vote:

AYES: COUNCILMEN: BUTTERFIELD, DONOVAN,
SCHMIT, ADAMS
NOES: COUNCILMEN: NONE
ABSENT: COUNCILMEN: LAKE

/s/ RUBY K. SILVA
CITY CLERK



INTRODUCTION AND BACKGROUND

Due to recent concern over the condition of the natural environment, the State of California has required all local governmental agencies to adopt a Conservation Element as part of the comprehensive General Plan. Since it is vital to plan for the wise use of our natural resources, the Garden Grove Conservation Element exceeds the minimum state requirements as mandated in Section 65302 of the Government Code and will prove to be a meaningful ingredient in Garden Grove's total planning effort.

The Legislature considers natural resources to be: water and its hydraulic force; forests; soils; rivers and other waters; harbors, fisheries; wildlife; minerals and other natural resources. In addition, a Conservation Element may include: reclamation of lands and water; flood control; prevention and control of water pollution; regulation of the use of land in stream channels; prevention, control and correction of erosion of soils; beaches and soils; protection of watersheds; location, quantity and quality of rock, sand and gravel resources. The Legislature further stipulates that water conservation plans be developed in coordination "with any County-wide water agency and with all district and city agencies which have developed, served, controlled or conserved water for any purpose for the county or city for which the plan is prepared."

Garden Grove is not abundantly endowed with natural resources. There are no forests, although many trees have been planted in the city. Garden Grove's soils have sustained agricultural uses for a number of years, but most of the city is now developed. No valuable minerals are known to exist in the ground beneath Garden Grove. There are no rivers or other natural bodies of water found in the city. The city has no fisheries or wildlife.

The one resource which is very important to all the residents of Garden Grove is water. Water is vital for the existence of every community in Southern California, including Garden

Grove. Because of this, the City must be concerned with the quantity and quality of the various sources of water in the region. To maintain a safe and healthy environment the City should also be concerned with the disposal of its wastewater and the control of flood water.

Many public and quasi-public agencies exist solely to supply, dispose of and control the water resources of the Southern California region. The Orange County Water District, for example, manages the ground water for the entire northern half of Orange County. So in order to understand what the future holds for Garden Grove's water needs, the City must be aware of the present activities and the plans of these regional agencies.

This is not meant to imply that Garden Grove has no effect on the conservation and control water resources – far from it. As a water consumer, Garden Grove can influence the total demand picture with which regional agencies must contend. Land use, zoning and population densities in particular determine the total aggregate use of water resources in the city. Political influence on the governing boards of regional conservation-oriented agencies may also play a factor. Appropriate flood control facilities can aid in recharging the groundwater basin instead of allowing rain water to flow into the ocean. These are some of the ways in which Garden Grove can aid in the control, conservation, and utilization of water resources.

The Conservation Element deals with taking stock of the existing conditions of water resources and flood control facilities. Goals and objectives are then formulated for each aspect of water use and control, followed by a section dealing with projections about the future of water resources and their control. A final section discusses the methods by which the Conservation Element may be implemented.

The Conservation Element is compatible with community environmental goals previously adopted by the City. The Growth Policy Element of the General Plan enumerates the following major goals for the conservation of the physical environment of Garden Grove.

Environmental Quality Goal

Optimum sustainable environmental quality levels with respect to air, water, sound levels, landscape and plant and animal life.

Natural Resource Goal

The wise use and the conservation of natural resources, enabling present residents to meet their needs and simultaneously protecting necessary resources for the use of future city residents.



GENERAL POLICIES

The Growth Policy Element of the General Plan has formulated many broad policies to the community as a whole. The following policies were developed to provide additional, more specific policies to guide in the creation of the Conservation Element, which in turn is a vital instrument in implementing all other elements of the City General Plan.

- A. The quality of life for each and every citizen should be the yardstick against which all implementable programs are measured. Protection of this quality is paramount.
 - 1. Environmental impacts must be assessed for all significant developments in the city (may be a formal or informal process).
 - 2. Factors or resources that have influenced today's high quality of life must be identified and measured and wisely used and conserved as much as possible.
- B. Planning decisions affecting the City of Garden Grove should be coordinated with other planning efforts in Orange County and the Southern California region, recognizing the interdependence of the City and surrounding jurisdictions.
 - 1. The City of Garden Grove should join together with other public agencies to combat environmental pollution in cooperation with private groups and organizations.
 - 2. The City should make every effort to support in any way possible, public and private agencies charged with conservation of natural resources.

- 3. The City should strive to support, where possible, regional public agencies so as to maximize the conservation and utilization of natural resources for the city and surrounding region.
- C. Growth throughout the city should generally follow existing patterns and be low density in character.
 - 1. Land use and zoning standards should be developed with a high environmental quality in mind.
 - 2. Excessive consumption of scarce resources by any segment of the community should be discouraged by any means practicable.
- D. The expansion of the economic and employment base should be supported when such expansion serves to reduce environmental pollution.
 - 1. Attraction of "low polluting" industries and commercial establishments is to be encouraged.
 - 2. High standards for the prevention of pollutants from existing industry should be set and enforced.

WATER SUPPLY

Garden Grove and the surrounding Southern California region are considered to have a rather arid climate. Fresh water, so vital to sustaining life and the existing standard of living, is a scarce resource. It is imperative that plans be formulated now to insure a continuing supply of pure water for current residents of Garden Grove and for generations to come.

The City of Garden Grove began as the Village of Garden Grove in the mid-1870's. As an agricultural settlement, water was vital to the development of a productive economy. Individuals obtained water simply by drilling shallow wells to tap sub-surface water. In the early years, Garden Grove and Orange County in general had a very high water table.

Gradually, as the area became urbanized, small independent wells increased in number and importance. In the 1920's, small independent water companies and Orange County Water District No. 3 were the most significant water purveyors in the city. The Metropolitan Water District (MWD) was formed in 1939 and began delivering imported Colorado River water to Southern California in the early 1940's.

By the 1950's, Garden Grove was served by the newly created Dyke Water Company, the Southern California Water Company, several small mutual water companies, private wells, and Orange County Water District No. 3. Sources of water were sub-surfaced groundwater plus imported water from MWD.

In 1958, Garden Grove established a municipal water system to serve city residents. Since that year, the City has acquired ownership or rights to operation of most other water purveyors within the city boundaries.

Currently, the municipal system supplies water to approximately

96% of Garden Grove's citizens, with 30,100 water accounts and 3,100 fire hydrants. The remainder of the city is served by the Southern California Water Company and a few small independent mutual water companies.

Existing Facilities and Sources

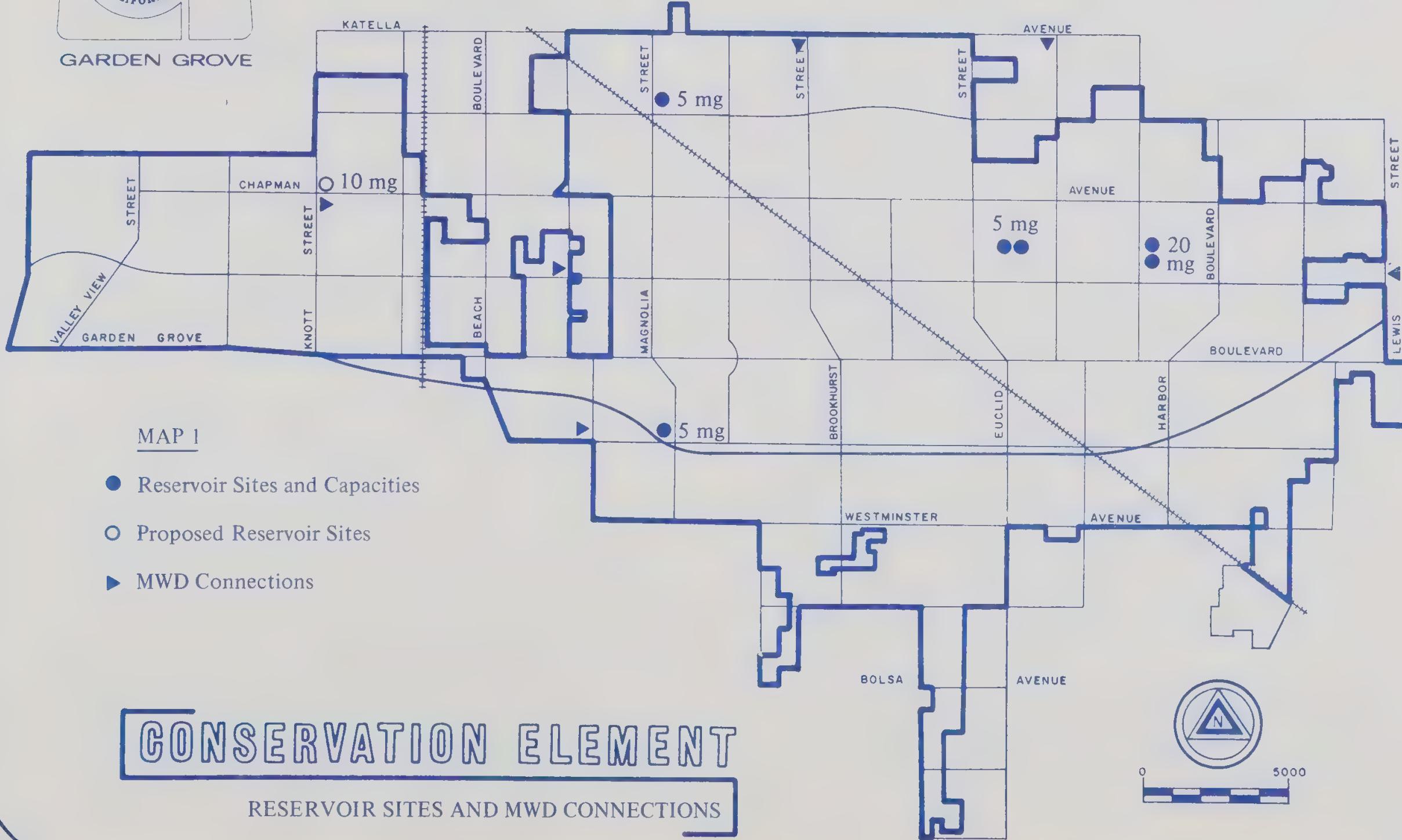
Two primary water sources are presently utilized to provide fresh water to the community. First, Orange County's groundwater basin is tapped via a series of water wells. In 1964, the City operated some 56 major wells, some of which were inefficient and antiquated. The City has since embarked upon a program of abandoning wells which do not meet minimum quality standards. At present, Garden Grove operates a total of 28 wells all of which meet minimum quality standards. In addition, several privately owned shallow irrigation wells continue to operate in the city. Water supplied via these wells is generally considered substandard, and usage of these wells is expected to decrease as agricultural land in the city becomes urbanized.

The second source of Garden Grove's water consists of water imported under the auspices of the MWD. Imported water may serve a dual purpose. First, either Colorado River water or Feather River water (from the State Water Project) may be recharged directly into the groundwater basin to raise the groundwater table. The recharging process is done by the Orange County Water District which utilizes portions of the Santa Ana Riverbed for ponding importing water, and natural flows of the river allow the water to sink into the groundwater basin system. Secondly, MWD water can be directly fed into the municipal system. Garden Grove currently has six MWD connections (See Map 1) with a peak capacity of 22,500 gallons per minute and a maximum interim capability of 34,200 gallons per minute.



GARDEN GROVE

GENERAL PLAN



All of Garden Grove's water is obtained from these two sources. Ninety percent of the total can be considered locally pumped water, while ten percent is imported water. Many factors bear on this ratio – availability of imported water, local groundwater conditions, and the relative cost to the City of these two sources. It currently is City policy to pump as much local water as possible, since local water is more economical and contains fewer total dissolved solids.

The City also owns and operates a municipal reservoir system which consists of six reservoirs with a holding capacity of 35 million gallons. The reservoir system is important for three reasons. First, in the event normal water supplies are curtailed such as from an earthquake or other natural disaster, the City does have an emergency supply. Secondly, a reservoir system is necessary to meet large emergency demands, such as a large fire. Finally, the City Water Department is allowed to temporarily store either pumped or imported water in the reservoirs during non-peak usage hours, to be used when demand exceeds well production capacity on a daily basis. Thus the reservoirs can be used to meet peak water demands in a cost-effective manner. (City reservoir locations are shown on Map 1.)

While much of Garden Grove's water transmission is adequate for residential, commercial, and industrial demands as well as fire suppression needs, a major difficulty may arise in the Community Center District (CCD). This area constitutes the oldest area of the city. As such, much of the CCD has been slated for redevelopment to higher uses in the near and distant future. Since most of the transmission lines are inadequate for future development, they must be replaced and, where necessary, enlarged and extended to meet the demands of more residents, more commercial and industrial consumption, and higher fire flow requirements in the future.

Objectives and Principles

The primary objectives of water conservation are as follows:

- A. It will be necessary to provide a continuous supply of fresh pure water to all city residents in a manner that is both conservation oriented and as economical as possible.
 1. Water must be made available commensurate with the land uses and densities proposed.
 2. The municipal Water Department should continue the program of upgrading, modifying and replacing existing City water wells. This is to provide water as efficiently, economically and with as little waste as possible.
 3. The City should continue the policy of purchasing nonmunicipal water purveyors within the City limits. This insures standardization of facilities which means better service for Garden Grove's residents.
 4. The City should rely as much as possible on locally pumped groundwater for a number of reasons.
 - a. Locally pumped water is less expensive than imported water.
 - b. The quality of local water is higher, containing less total dissolved solids.
 - c. Since water quality is higher, this means water reclamation processes operated by the Orange County Water District can be accomplished more easily.
 5. New municipal wells should be drilled as quality and system demands require.
 6. The City should aid all regional agencies in maintaining and improving the quality of Orange County's groundwater basin.

- B. Efforts should be made to insure that the municipal reservoir system continues to meet minimum standards established by the City Water Department.
- C. Efforts should be made to meet and maintain the City's current fire protection standards of 1,000 gallons per minute at a residual pressure of 20 pounds per square inch for residential uses and 2,000 gallons per minute at a residual pressure of 20 pounds per square inch for commercial and industrial uses.
- D. The City of Garden Grove should continue to express utmost concern for the preservation and conservation of our water supply.

Future Water Supplies

Two primary resources can be utilized to assure Garden Grove a continuing supply of fresh water for future use – the Orange County groundwater basin and the MWD surface distribution system which delivers imported water directly throughout the county to member agencies.

The following discussion will focus first on the regional water outlook for future water supply, then the City picture will be examined.

THE REGION

The County Groundwater Basin has been described as follows by Langden Owen in his 1970 report to the Orange County Water District on Water Resources Management:

"The Orange County Groundwater Basin which underlies the area of the Orange County Water District is the southern extension of a broad alluvial coastal plain as shown on (Map 2). Its major features are the surrounding hills and mountains. The gradual sloping alluvial plain to the coast, and the alternating gaps and rises along the coast through which the Santa Ana

River has flowed through past geological time. A primary feature of the basin not visible from the surface is the Newport-Inglewood structural zone. This fault zone has effectively sealed the groundwater basin from the ocean at depth. However, in the several gaps along the ocean front there is free access between the ocean and the groundwater basin in the top 200 feet of recent alluvial fill. (Figure 1) shows a typical cross section of the Groundwater Basin. In the center and deepest portion of the basin, generally in the vicinity of Anaheim, Garden Grove and Santa Ana, the fresh water base is over 4,000 feet deep. The fresh water base rises to an elevation of about 200 feet along the coast to coincide with bedrock along the mountains and along the mouth of the Santa Ana River."

The Orange County Water District (OCWD) is and has been involved with replenishing the groundwater basin through percolation of MWD and State Water Project water in the Forebay Area of the basin. The OCWD controls approximately 850 acres of the Santa Ana River bed between Imperial Highway and Ball Road. This area of the river is used to artificially place underground more than 108,000 acre-feet (a.f.) of water annually (1970 figure). The amount of imported water recharged into the basin will increase as county population pressure requires.

The OCWD also operates two off-channel (i.e. not located on the Santa Ana Riverbed) spreading basins which replenish the groundwater basin in the same manner as the channel facilities. These off-channel basins also fulfill two secondary functions. The sand and gravel excavated from the basin have a significant economic value. Secondly, due to the simple nature of the water spreading operation, it has been found that recreational and functional purposes can be combined. Crill Spreading Basin, also known as Anaheim Lake, is a popular place for local fishermen.

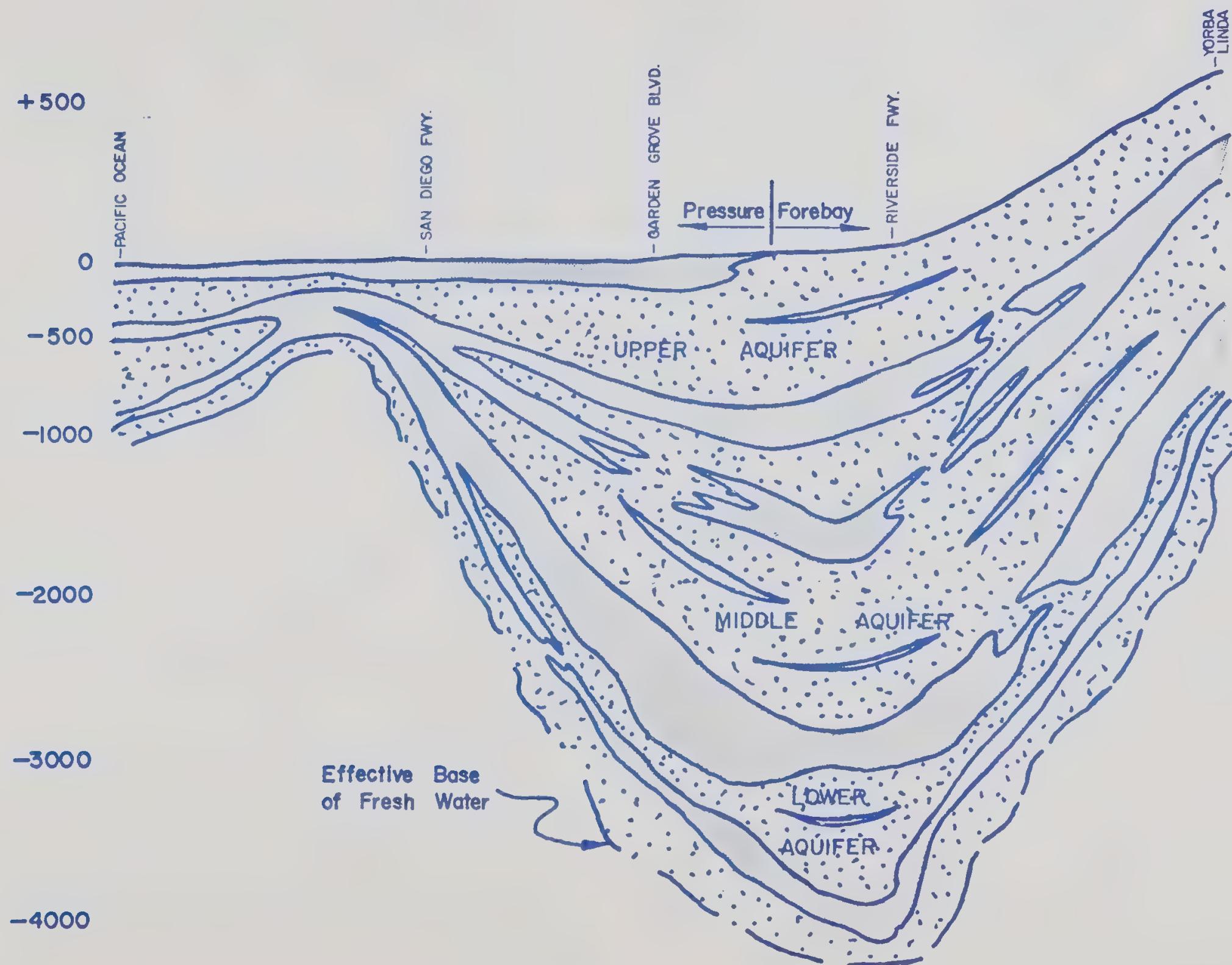
In 1967, the OCWD began operating a system of extraction and injection barriers which controls sea water intrusion during periods of basin over-draft. The coastal barrier system at the present time is comprised of a line of extraction wells located

MAP 2



ORANGE COUNTY GROUND WATER BASIN

FIGURE 1



CROSS SECTION OF ORANGE COUNTY GROUND WATER BASIN

approximately two miles from the Orange County coast which intercept intruding ocean salts and return these waters to the ocean. A parallel line of injection wells located about two miles farther inland is used to inject water and form a hydraulic mound which stops seawater intrusion and at the same time feeds producing wells along the coastal section of the basin.

Current barrier facilities are sufficient to protect the groundwater basin with an overdraft of approximately 800,000 a.f. Additional facilities will be constructed to allow even greater overdrafts of the basin. The OCWD estimates it will cost approximately \$17 million to develop the optimum utilization of the basin as a storage facility.

The second major water resource in Orange County is the MWD surface distribution system. Map 3 details the extent of the MWD facilities within the county. Water received from the MWD serves two functions. First, two connections from the MWD upper feeder divert water down to the Santa Ana River to be spread in the channel and off-channel facilities for percolation downward into the ground water basin. Secondly, there are approximately 30 major water purveyors in the county – of which the Garden Grove Water System is one – which take delivery of the MWD product and distribute water directly to local users in their jurisdictions. Many purveyors, including Garden Grove, blend MWD surface water with groundwater in dual facilities.

Based upon OCWD projections, future demand for water within northern Orange County is shown in the following table:

Year	Water Demand
1970	325,000 a.f.
1980	450,000 a.f.
1990	560,000 a.f.
2000	660,000 a.f.

A multiplicity of water sources will be needed to meet estima-

ted future demands. Eleven potential sources have been identified by the OCWD. All are being or will be utilized to provide water to Orange County residents depending upon economic constraints and other conditions existing at particular moments in time.

Local Precipitation. A portion of the rainfall which falls in the forebay area of the basin, after consumptive use, percolates into the groundwater basin. Rainfall occurring in the pressure area is collected and runs off to the Pacific Ocean. A certain percentage of the pressure area runoff can be considered a potential source of water if facilities could be constructed which would capture and return the water to the forebay for groundwater recharge.

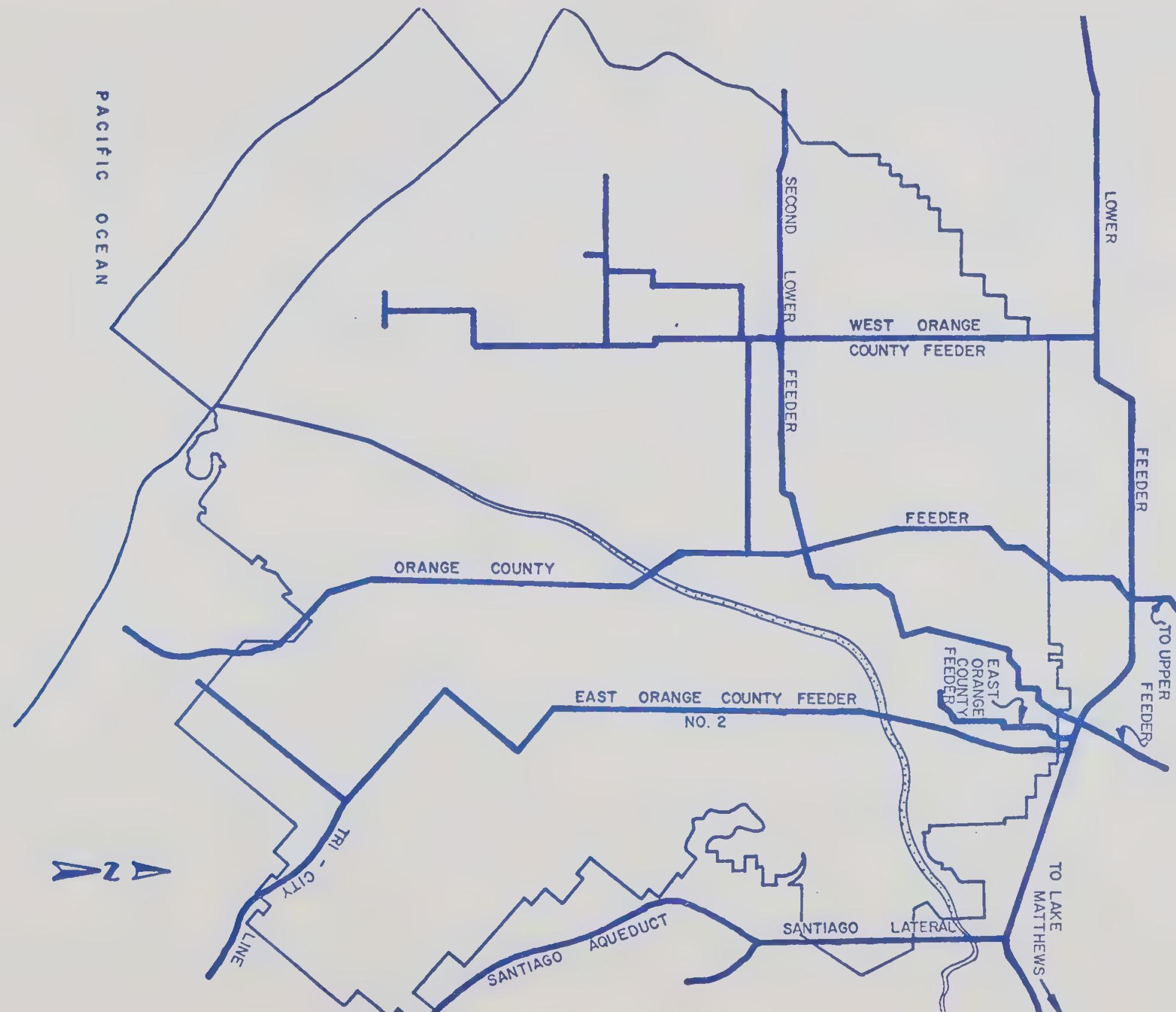
Return Flow. Water used for irrigation of lawns, gardens and crops percolates back into the groundwater basin. It is anticipated that the quality of this water will increase as more high quality State water (as opposed to currently imported Colorado River water) is brought into the county. It is further assumed that all toxics will be removed from sewerage return flow.

Prado Rising Water. The watershed of the Santa Ana River above Prado Dam consists of 2,000 square miles. Rising water occurs at Prado Dam from this drainage area throughout the year, resulting from upstream return flows and a limited drainage.

Colorado River Direct Service. The MWD imports Colorado River water to member agencies of the MWD through the Colorado Aqueduct.

Softened Colorado River Water Direct Service. A portion of the MWD Colorado River water received by the OCWD has undergone a treatment process at the La Verne Plant designed to soften the water. The availability of softened water in Orange County, however, is constrained by the capacity of the La Verne Plant. The possibility of future water softening at the Diemer Plant, which provides principal service to Orange County, is being studied to determine the effects of high quality State water in the county.

MAP 3



State Water Direct Service. As of 1973, State water project water from the Feather River will become available to Orange County. Essentially, the State will deliver water to the MWD, which in turn will serve the residents of the county. The availability of State water thus depends on the capability of the MWD distribution system.

Prado Storm Water. Orange County has the legal right to conserve storm flows to the Santa Ana River through the construction and operation of conservation facilities at Prado Dam. Currently, only one single-purpose flood control structure has been installed.

Feasibility studies are now being conducted by the U.S. Army Corps of Engineers, State Department of Water Resources and Orange County Water District to develop multipurpose facilities for flood control, water conservation, water quality improvement, recreation, and environmental enhancement. It may also be possible to utilize Prado Dam for storage of surplus Colorado River or State water.

Colorado River Replacement Water. This is considered to be water not required for direct service of constituent MWD agencies. Availability is totally dependent on other water users within the system.

State Surplus Water. If surplus water is available over and above the amount required by contract, it may be sold at a lower than usual rate.

Forebay Wastewater Reclamation. At the present time there exist no facilities for reclaiming wastewater in the Forebay Region of the basin. Currently, some 15,000 acre-feet of waste water per year could be treated. By 1990, the figure is expected to grow to 150,000 a.f. per year.

Pressure Area Reclamation. In conjunction with the Orange County Sanitation Districts (OCSD), the OCWD is deeply involved in reclaiming waste water. Currently, the OCWD is constructing a large scale advanced waste water reclamation

plant and seawater desalting module in Fountain Valley.

At ultimate capacity, this facility, Water Factory 21, will salvage 15,000 a.f. of desalinized sea water. The water from the two processes will be blended and injected into the underground water system. A portion of this water will act as a barrier to control sea water intrusion and the remainder will be available as a groundwater supply to the coastal communities.

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Due to the configuration of the legal and institutional arrangements, the City of Garden Grove is highly dependent on the OWCD for groundwater basin management and replenishment as well as the various branches of the MWD for imported water.

Based upon the Growth Policy Element's population projections, the Land Use Element's land use projections, and City Water Department base figures, the future demand for City water is projected in Table 1. This demand will be met by continuing current water production policies and practices. More water wells will be drilled on an "as necessary" basis, the critical variable being development pressures. The City Water Department will continue its program of well upgrading.

In addition, another MWD connection is under consideration, to be located in the Magnolia-Katella area. Current policy in the City Water Department is away from surface distribution facilities and toward pumping from the groundwater supply.

Finally, one more storage reservoir is being constructed for Garden Grove with a total capacity of 10 million gallons. This underground reservoir will be located in west Garden Grove on the Chapman Intermediate School site. This will bring the City's storage capacity up to the minimum standards established by the municipal Water Department.

The system of water supply currently in existence, whereby water is obtained by a combination of pumped basin water and imported surface distributed water, depending on economic con-

TABLE 1
PROJECTED WATER USE BY LAND USE
(In acre feet)

Land Use	1972	1980	1990	2000
INDUSTRIAL	151.00 (0.7%)	338 (1.3%)	570 (1.9%)	759 (2.3%)
RESIDENTIAL	17,003.50 (81.5%)	20,852 (80.2%)	23,640 (78.8%)	25,707 (77.9%)
AGRICULTURAL	36.20 (0.2%)	0 (0%)	0 (0%)	0 (0%)
COMMERCIAL	1,855.14 (8.8%)	2,574 (9.9%)	3,270 (10.9%)	3,828 (11.6%)
PUBLIC	1,863.30 (8.9%)	2,236 (8.6%)	2,520 (8.4%)	2,706 (8.2%)
Total	20,900.00 (100.1%)	26,000 (100%)	30,000 (100%)	33,000 (100%)

Source: Garden Grove Water Department
 Projections by Urban Development Department

ditions and availability of supply, will best serve the citizens of Garden Grove through the year 2000. The Secretary-Manager of the Orange County Water District has recommended that water purveyors "develop systems that give them some latitude in operation to select between groundwater and surface water, dependent upon the overload of the surface water supply facilities or the cyclic variations of groundwater." (Water Resources Management, 11/70). By employing such a system, Garden Grove can enjoy great flexibility in assuring future water supplies. In addition, the City can incur certain economies in operation by selecting the source which is less expensive at the moment.

New construction programs have already been planned and partially implemented in the Community Center District (CCD) and Central Industrial District (CID). Additional facilities are being constructed as new developments come into these areas of the city, rather than all at once. A continuous program of maintaining existing facilities will also be in operation and all transmission and distribution lines should be up to City standards.

It is in the best interest of the citizens of Garden Grove to support the OCWD in their efforts designed to protect and upgrade the Santa Ana River Bed and off-channel facilities. The District must be aided in developing environmental enhancement plans for the Santa Ana River and Crill and Warner Basins. Specifically, the OCWD has embarked upon a program of opening district-owned lands to public access, as long as such access does not interfere with primary function of groundwater replenishment. Examples of such enhancement plans include Anaheim Lake (Crill Recharging Basin) and Five Coves Beach along the Santa Ana River.

Finally, it is imperative that the City continue to express goals congruent with the action of all regional agencies involved with conserving our water resources. For instance, moral support should be given to the OCSD and OCWD for jointly developing Water Factory 21 – a pilot plant for reclaiming waste water and desalting seawater. Such a facility is necessary to insure that a sufficient quantity of high quality water will always be available to Garden Grove citizens.

WATER QUALITY

In addition to supplying enough water to meet Garden Grove's needs, it is necessary to be sure that the quality of the water supplied is not detrimental to the health of Garden Grove's citizens or the viability of the City's economy. The City is presently using the highest quality water available to it and will continue to do so. The City can, however, give moral support to those agencies concerned with maintaining the quality of water resources utilized by the City.

Present Water Quality: The Region

Garden Grove is situated in the lower portion of the Santa Ana River Basin. The quality of both surface and groundwater in the Lower Basin is generally poor. According to a report prepared for the Santa Ana Watershed Planning Agency by Water Resources Engineers, Inc. "Most of the surface water entering the Lower Basin comes from the Upper Basin and reflects upstream water use and degradation. Poor quality groundwater in the Lower Basin results primarily from the recharge of surface and imported waters, in basin degradation, and sea water intrusion."

The quality of water in the Santa Ana River has deteriorated over time to the point where only surface waters in the upper portion of the Santa Ana River Basin are high in quality. As Figure 2 shows, water quality in the lower reaches of the Santa Ana River has progressively worsened. The concentration of total dissolved solids in the Santa Ana River becomes as high as 700 milligrams per liter, as compared to a total dissolved solid concentration of about 150 milligrams per liter in the upper reaches of the Santa Ana River.

Groundwater in the Lower Basin is in about the same condition as surface water. According to the Santa Ana Watershed Planning Agency report, "By 1968 over 75 percent of the pumped groundwater exceeded the recommended drinking water stan-

dards. Along the coast sea water intrusion caused high total dissolved solid levels while local degradation and the recharge of poor quality water produces high total dissolved solid levels in the middle and upper portions of the Lower Basin." Although total dissolved solid levels in most of the Lower Basin groundwater are in excess of the recommended U.S. Health Service standard of 500 milligrams per liter, it is not thought to be detrimental to the health of the area's residents. The total hardness of the water does, however, have some negative economic ramifications for the residents of the area.

Present Water Quality: Garden Grove

The quality of water in Garden Grove is good when compared to water quality in most of the region. In the past, the City had a problem with high nitrate levels in water extracted from some of its shallower wells. Deeper wells have been drilled, however, and excessive nitrate conditions were eliminated as the affected wells were closed down.

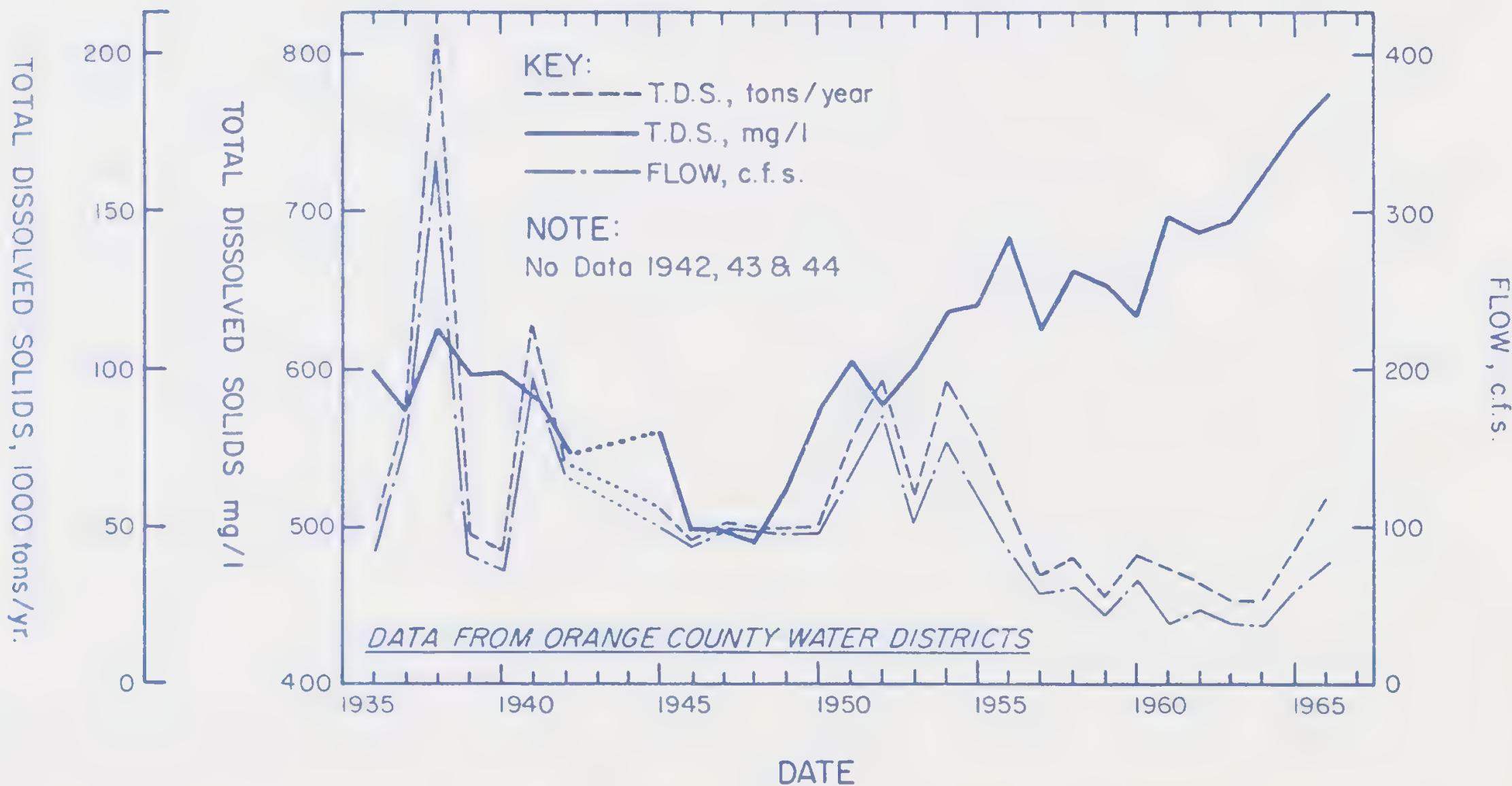
Today, the City's wells vary between 150 and 1,200 feet in depth. They yield water which averages 575 milligrams per liter of total dissolved solids.

Objectives and Principles

At the present time the Santa Ana Watershed Planning Agency is considering several alternative plans for controlling water quality in the Santa Ana River Basin. The overall water quality objective is to maintain or enhance existing water quality in all cases where it is feasible. This means that:

- A. The total dissolved solids count of delivered water should not exceed 500 milligrams per liter.

FIGURE 2:



HISTORY OF WATER FLOWING PAST PRADO DAM

SOURCE: Santa Ana Watershed Planning Agency by WRE, Inc.
Santa Ana Regional Water Quality Control Board

- B. The total dissolved solids count of surface and groundwater should not exceed 500 milligrams per liter.
- C. A salt balance condition in groundwater should be maintained to prevent degradation.

Future Water Quality: The Region

There are several ways to maintain or improve future water quality and meet the objectives listed above. These are: 1) Source allocation control; 2) the improvement of imported water; 3) the improvement of wastewater treatment; 4) groundwater replenishment; 5) groundwater quality control. All of these methods will be considered by the Santa Ana Watershed Planning Agency in planning for the future quality of water in the Santa Ana River Basin.

The allocation of water resources may be changed by encouraging or requiring some industrial, agricultural, and commercial users to recycle their wastewater. In addition, the Orange County Coastal Project (Water Factory 21) will reclaim wastewater and distill seawater which will be used as a saltwater barrier and as an additional source for groundwater replenishment.

The quality of imported water will be improved when water from the State Water Project becomes available to the Metropolitan Water District temporarily in 1973, and on a permanent basis in 1976. This water is high in quality with a total dissolved solid count of approximately 330 milligrams per liter. (Colorado River water has a total dissolved count of 730 milligrams per liter.) By recharging State Water Project water into the groundwater basin the overall quality of groundwater should be improved.

The improvement of wastewater treatment facilities by cities and sanitation districts in the Santa Ana River Basin will be necessary to keep the number of organisms in our water at a safe level. Wastewater treatment facilities will have a negligible effect, however, on the mineral content of our water.

Groundwater replenishment will be accomplished in three stages by the Orange County Water District. Until 1978 there will be an intentional overdraft of the groundwater supply to reduce the volume of high total dissolved solid water. Between 1978 and approximately 1990 the lower groundwater basin will be refilled using State Water Project water and recycled local water. After 1990 these sources will be used to maintain a stable water level in the basin.

The replenishment of the lower basin groundwater will improve its quality and quantity. In order to maintain quality groundwater, a facility is planned to reduce the amount of salt flowing into the lower basin. This facility will consist of a water reclamation plant and a desalter and will be located in the Forebay Area of the lower basin. The source of supply for the desalter will be effluent from the Reclamation Plant and diverted Santa Ana River base flow.

Attainment of the objective of 500 milligrams per liter total dissolved solids for delivered water would require that some output from the desalter be delivered directly to consumers for a period of time. After that time all output from the Forebay Desalter and the Forebay Reclamation Plant would be used to replenish the lower groundwater basin and to help meet the salt balance objective. The salt that is taken out at the Forebay Reclamation Plant will be transported through a brine pipeline to the ocean where it will be deposited.

If all the above steps are taken, quality water should be available to consumers in the Santa Ana River Basin for years to come.

Future Water Quality: Garden Grove

If the actions discussed above are implemented and if the City continues to drill wells which tap the deeper and purer parts of the groundwater basin, the quality of the water supplied to the residents of Garden Grove should at least remain at its present level and may improve. This means that the costs paid by the consumer to overcome water quality related problems should

remain about the same.

To be sure that the residents of Garden Grove are supplied with water of adequate quality in the future, the City should give moral support to the efforts of all agencies concerned to improve water quality in the Santa Ana River Basin. In addition, the City should continue its policy of drilling wells which tap the deeper sections of the groundwater basin.



SANITATION

Aside from being concerned with the quantity and quality of the water supplied to the residents of Garden Grove, we must also be concerned with the disposal of this water after it is used. An effective sanitation system is vital if we wish to maintain a healthy environment in the community. At this time, the sanitation needs of Garden Grove are fulfilled by the Garden Grove Sanitary District, the Midway City Sanitary District, and Districts 2 and 3 of the seven Orange County Sanitation Districts.

The Garden Grove Sanitary District and the Midway City Sanitary District are involved in retail collection of sewage. They provide and maintain lateral (feeder) lines for the collection of wastewater and also collect solid waste.

Wholesale collection, treatment, disposal, reclamation and related activities are primarily the responsibility of the Orange County Sanitation Districts. The Sanitation Districts were originally formed by the County Board of Supervisors, but control of each district is vested in separate boards of directors. The seven separate boards join as a single body to operate their treatment facilities and ocean outfall. The joint boards hire a single professional staff to administer the work all districts and to operate the joint treatment facilities.

Existing Facilities and Operations: The Region

At the present time, the seven Sanitation Districts own and maintain about 400 miles of major trunk sewers with more than 27 pump stations. Jointly, the Districts operate two treatment plants to process wastewater to the ocean. Each

district must pay its share of the operating costs on the basis of how much it uses the treatment facilities.

Plant No. 1, located about four miles from the coast adjacent to the Santa Ana River bed, has an operational hydraulic capacity of 79 million gallons per day. The average flow per day is 46 million gallons. This plant gives primary treatment to all of its flow and secondary treated water is made available to a tertiary treatment plant for the Orange County Water District salt water intrusion barrier project.

Plant No. 2 is located 1,500 feet from the ocean at the mouth of the Santa Ana River and can handle a hydraulic load of 170 million gallons per day. The flow averages about 85 million gallons per day and is given primary treatment.

Serving both plants is one of the world's largest chlorination stations for disinfection of the effluent and outfall booster facilities used to pump the flow through a new ocean outfall which extends five miles to sea, having a hydraulic capacity of 480 million gallons per day. The ocean water and beaches near the outfall are checked regularly for signs of excessive discharge to the marine environment. At this time, the only problem experienced is with the level of heavy metals discharged. These may be harming sea life in the area of the outfall.

Individuals and private and public organizations may use the facilities of the Orange County Sanitation Districts after obtaining connection and use permits from their district. To be eligible for these permits, an applicant must meet certain standards for the quantity and the quality of the water they discharge. After the permits are issued, the quantity and quality of the water discharged is monitored by the sanitation district. If the user does not fulfill the conditions of the permits, he can be penalized.

Existing Facilities and Operations: Garden Grove

As mentioned previously, the Garden Grove Sanitary District, the Midway City Sanitary District, and Districts 2 and 3 of the Orange County Sanitation Districts provide sewer lines for Garden Grove. The Garden Grove Sanitary District serves most of Garden Grove except for the area west of Knott Street. This area is served by the Midway City Sanitary District. District 2 of the Orange County Sanitation Districts serves the area of Garden Grove that is generally east of Euclid Street. The rest of the city is served by District 3.

The Garden Grove Sanitary District was formed in 1924. It is governed by a five member board of directors and disposes of solid as well as liquid waste. The District works with builders to provide sewage lines to new developments. The District operates by a plan where a builder at the end of a long connecting sewer line pays the cost of the entire line, with the District cooperating in reimbursement by other builders between him and the existing system as the intervening property is developed. This has meant the installation of a multi-million dollar sewer network at no cost to the District. Those who wish to use District facilities that are already built must pay the District a sewer use fee.

The Midway City Sanitary District operates in about the same way as the Garden Grove Sanitary District, except for the way in which it handles trash collection. While the Garden Grove Sanitary District contracts this out, the Midway City Sanitary District provides this service itself.

General Regionwide Goals

The California Regional Water Quality Control Board for the Santa Ana Region has adopted the following regionwide goals (as listed in their interim water quality control plan) for wastewater management in the Santa Ana River Basin.

- A. Protect and enhance all state water, surface and underground, fresh and saline, for present and anticipated beneficial uses including aquatic environmental values.
- B. The quality of all surface waters shall be such as to permit unrestricted recreational use, whenever practical.
- C. Manage municipal and industrial wastewater as part of an integrated system of fresh water supplied to achieve maximum benefit of fresh water resources.
- D. Achieve maximum use of fresh waters through recycling for agriculture, industry, and municipalities.
- E. Achieve maximum use of fresh water through wastewater reclamation and reuse by compatible industries, municipalities, and agriculture.
- F. Continually improve waste treatment systems to assure consistent high-quality effluents.
- G. Develop a planned system for water use and waste discharge to assure protection to the aquatic resource for future beneficial uses and to achieve harmony with the natural environment.

Management Principles

To implement these goals, the California Regional Water Quality Control Board will base its activities on the following management principles (as stated in their interim water quality control plan):

- A. No current or proposed program which includes waste disposal to an aquatic environment shall be necessarily be considered a permanent solution.
- B. Dumping from vessels in the open ocean and coastal water, by any person subject to the jurisdiction of the Regional

Board and which may affect the quality of said waters, shall not constitute a satisfactory permanent plan for the disposal of waste.

- C. All water quality management systems throughout the region shall provide for eventual wastewater reclamation and shall permit discharge of wastes to the aquatic environment only as a interim solution when wastewater reclamation is precluded by processing costs or lack of need for reusable water.
- D. The number of waste sources to the region and the number of independent treatment facilities shall be minimized, and plans shall direct these consolidated systems to maximize their capacities for wastewater reclamation, assure efficient management of wastes, and meet potential demands for reclaimed water.
- E. Existing and future discharge pipelines extending into tidal waters shall be ultimately used to provide only fail-safe protection against the breakdown of reclamation systems, to convey saline solutions, or to discharge excess water beyond the needs for reclaimed water.
- F. Land use practices must assure protection of beneficial water uses and aquatic environmental values.
- G. Rapid development of treatment and discharge systems shall be promoted to provide for fail-safe protection of beneficial uses and aquatic environmental values during the interim period leading to maximum reuse of fresh waters.
- H. Source control and pretreatment shall be required to minimize discharge of conservation toxicants and biostimulants to surface waters and to minimize discharge of dissolved salts to groundwater and fresh surface water.
- I. Develop beneficial uses of residual wastes.

General Prohibitions and Regulations

In order to follow these management principles, the California Regional Water Quality Control Board has adopted the following general prohibitions and regulations (as stated in their interim water quality control plan):

- A. Industrial and municipal discharges containing the following substances in excess of natural levels are prohibited from discharging to surface waters: (list not necessarily all-inclusive) pesticides, toxic substances, radioactive substances in excess of levels allowed by California Administrative Code, mercury or mercury compounds.

(Note: As mentioned previously, the Orange County Sanitation Districts have adopted an ordinance which controls the quantity and quality of wastes that can be discharged by industrial users.)

- B. All grading or other construction activity and irrigation return flows which do not incorporate controls to prevent siltation from occurring in streams, reservoirs, lakes, bays, and estuaries are prohibited.
- C. The discharge other than a natural discharge from any source of oil or grease which produces a visible effect on or in the water is prohibited.
- D. Solid or semi-solid waste discharged in a manner which impairs beneficial water uses or is deleterious to aquatic life, from land or from a vessel to surface water, either tidal or fresh, that contains any of the following is prohibited (list is not all inclusive): garbage, refuse, solids from industrial or agricultural operations, sewage sludge, radioactive material, explosive material, toxic matter.

Health Considerations

The primary public health considerations of the California Regional Water Quality Control Board as stated in their interim

water quality management plan for the Santa Ana River Basin are as follows:

- A. Protection of the critical and essential public health related beneficial uses of ground and surface water resources including:
 - 1. Domestic water supply
 - 2. Municipal water supply
 - 3. Water-oriented recreation
- B. Protection of the public against the hazards of disease transmission related to the collection, treatment, disposal, and reuse of wastewater generated in the region. In this regard, the following principles should be followed in managing wastewater and setting requirements:
 - 1. Wastewater should preferably be confined to an area under control of the discharger and the public excluded unless the wastewater is being reclaimed for uses where the public is permitted to have access.
 - 2. Where wastewater discharges cannot feasibly be confined to controlled areas, then higher degrees of treatment will be necessary to protect the public health.

Wastewater Management Plan: The Region

To meet the regionwide goals and to satisfy the management principles, prohibitions and regulations, and health considerations listed above, the California Regional Water Quality Control Board has developed an interim plan for wastewater management in the Santa Ana Region. According to this plan, the County Sanitation Districts of Orange County (CSDOC) should

intercept the treatment plants at the cities of Brea and Seal Beach, the U.S. Naval Weapons Station, Seal Beach, and areas presently unsewered.

In addition, the CSDOC should provide interceptor, treatment, and ocean disposal capacity to accommodate parts of Riverside and San Bernardino counties principally for the purpose of removing highly mineralized wastewater from these areas.

In order to treat the increasing waste loads and meet the provisions of the Water Quality Control Plan for Ocean Waters of California, County Sanitation Districts of Orange County plant expansion and improvement is necessary. OSDOC should expand and upgrade the existing treatment and operations. According to the California Regional Water Quality Control Board interim plan, this should include:

- A. Additional treatment necessary to meet the Water Quality Control Plan for Ocean Waters of California.
- B. Completion of sludge dewatering facilities and abandonment of sludge drying beds.
- C. Continued construction of facilities to control objectionable odors.
- D. Institution of industrial waste controls to identify and eliminate substances that are toxic in the marine environment.
- E. Conduct self-monitoring program adequate to insure compliance with Ocean Plan.

At this time, the Orange County Water District is reclaiming about 15 million gallons per day of waste by tertiary treatment from CSDOC Plant No. 1 and blending it with demineralized seawater intrusion. According to the California Regional Water Quality Control Board's interim water quality control plan, any additional reclamation is dependent upon:

- A. Finding uses for reclaimed water.

- B. Enforcement of wastewater (sewer) ordinances to exclude highly mineralized wastes from reclaimable streams.
- C. Improved water supply quality to service area through municipal treatment or change in import supply quality.
- D. Additional salinity control facilities and programs.
- F. Encourage and support studies on agricultural water use in relation to water quality management.
- G. Require that all future designs of wastewater treatment facilities include a nitrification parameter.
- H. Request the producers and distributors of soluble boron products to eliminate or substantially reduce boron from all outlets in the basin.
- I. Discourage the disposal of economically reclaimable wastewater by evaporation or to the ocean.
- J. Continue to support and promote a non-reclaimable waste disposal system that is compatible with good water quality management of both fresh and ocean waters, and is regional in concept.
- K. Encourage the removal from the basin, of highly mineralized wastes by a non-reclaimable waste disposal system, or reclamation via desalinization of groundwater or poor mineral quality.
- L. Continue to encourage the development of good quality imported water.
- M. Encourage and support studies of water quality management by selective restriction of land use to minimize or preclude highly degrading water uses that cannot be economically prevented.
- N. Integrate water quality management with other planning activities such as recreation planning.
- O. Provide protection to the river and adjacent lands within the flood plain zone from any activities which would adversely affect the water quality or aquatic environment.
- P. Continue support and participation in the planning of the proposed Corps of Engineers project to construct Prado

Future Implementation Actions

Because the present plan for water quality control in the Santa Ana River Basin is only an interim plan, it can be expected that the California Regional Water Quality Control Board will take action in the future (according to the interim water quality control plan) to:

- A. Upgrade the degree of treatment necessary for all municipal waste discharge to the Santa Ana River.
- B. Review, and where necessary, revise waste discharge requirements in the basin.
- C. Institute a formal program prohibiting the discharge of animal waste, liquid or solid, to the Santa Ana River and tributary drainage channels.
 - 1. Require protection to prevent runoff from all animal waste stockpiles.
 - 2. Establish general criteria on all animal industry waste to assist in developing planning controls to possibly limit the production of such waste.
- D. Establish a program to require that application of all types of fertilizer be limited to only the amount necessary based on currently available information.
- E. Establish a program to control collectible (subsurface or tail water) agricultural waste.

Dam for multiple purpose operation, including water conservation.

Q. Review results of all water quality oriented study programs for possible use by the Board to maintain and improve on the water quality objectives.

Surveillance Program

To be sure that their plans are being carried out, the State Water Resources Control Board and California Regional Water Quality Control Boards have an established program of surveillance based on discharger self-monitoring, regional board routing, sampling and date acquisition from other state agencies. According to the California Regional Water Quality Control Board, Interim Plan for Water Quality Control, the objectives of a comprehensive surveillance or monitoring program for water quality management are to identify:

- A. Compliance and non-compliance with water quality criteria
- B. Water quality baselines and trends
- C. Improvements in water quality produced by abatement measures undertaken
- D. Emerging water quality problems, in sufficient time to effect adequate preventive measures.

Future Projections: Orange County Sanitation Districts

Figures given by Orange County Sanitation Districts engineers show that total waste is expected to increase by the year 2000 as follows:

Year	Average Flow	Peak Flow
1975-76	166 MGD	266 MGD
1980-81	201	317
1985-86	237	370
1990-91	268	416
1995-96	297	459
2000-01	320	494

Also, per capita raw waste is expected to increase from 106 gallons per day per person in 1972 to an estimated 125 gallons per day per person in the year 2000.

Future Facilities and Operations: Orange County Sanitation Districts

To satisfy the requirements and recommendations of the Regional Water Quality Control Board and to accommodate the increased flow of wastewater as it develops, the Orange County Sanitation Districts will upgrade and enlarge their facilities and put tighter controls on industrial waste discharge. According to Sanitation District officials "the Sanitation Districts currently have a secondary treatment process under design to meet the anticipated requirements of the Regional Water Quality Control Board." This will allow the Districts to reclaim more wastewater for use by the Orange County Water District at their Water Factory 21 project.

In addition to the improved treatment, the Districts will increase the capacity of their plants to match the increased flow of wastewater as it develops. In the near future, this increase will pose no problem as far as treatment facilities are concerned; the utilization of existing facilities is not nearly up to capacity now. There is ample room for expansion of treatment plants on existing sites. Collector sewage lines owned and maintained by the Sanitation Districts are deemed adequate by officials of the Districts and will be expanded as necessary.

To meet the Regional Water Quality Control Board's new discharge requirements for heavy metals, the Districts may have to pass ordinances which severely limit the percentage of heavy metals that can be discharged by industrial users. Attempts will be made to aid industrial users in meeting these requirements.

Future Facilities and Operations: Garden Grove

The facilities provided by the four agencies responsible for sanitation in Garden Grove are adequate at the present time. As Garden Grove grows and changes, these facilities may have to be improved. This will be especially true of the Community Center redevelopment area and the Central Industrial District. As long as growth within the city is controlled, however, there should be no problem in providing adequate sanitation facilities.



FLOOD CONTROL

Much of Orange County and all of Garden Grove is on the flood plain of the Santa Ana River. In the event of a severe flood, it is probable that most of Garden Grove would be subjected to flooding. According to Orange County Flood Control District officials, "Large floods from the Santa Ana River and from local flooding would undoubtedly cause millions of dollars property damage in Garden Grove as well as possible loss of life, and vital services would be disrupted." In order to prevent occurrences of this kind, the City must cooperate with agencies that provide major flood control facilities for Garden Grove. Adequate flood control facilities will ensure the safety of Garden Grove's residents and will conserve property values in the city.

Existing Facilities and Operations

At this time, the Orange County Flood Control District and the Army Corps of Engineers have the responsibility of providing the major flood control facilities to prevent flooding in the county. Garden Grove is responsible for providing an adequate drainage system to supplement the Flood Control District's facilities. The following discussion will focus on the existing facilities provided by these agencies for the region and the city.

THE REGION

The Orange County Flood Control District was formed by an act of the State legislature in 1927 and is governed by the Orange County Board of Supervisors. The District's first and foremost function is the protection of life and property from the destructive forces of floods. To accomplish this task, the Flood Control District owns and maintains approximately 300 miles of major flood control channels as well as hundreds of miles of smaller collector channels.

A secondary and lesser known function of the District is the conservation and augmentation of our water resources. Several dams in the county, as well as Prado Dam in Riverside County, are utilized for this purpose. In addition, the District owns several reservoirs and retarding and spreading basins throughout the county. Rainfall runoff is captured by the flood control channels and carried either to one of the spreading basins for percolation down to the water table, or directly to one of the District's reservoirs. The Flood Control District allows the Orange County Water District to use its facilities for spreading imported water. In some cases, these facilities are also used for recreational purposes, such as fishing and boating.

The Army Corps of Engineers owns and maintains several dams in the county as well as Prado Dam. Prado Dam is an integral link in the region's flood control system. Because all of the runoff from the San Bernardino-Riverside area comes down the Santa Ana River to Orange County, a facility is necessary to control the flow. Prado Dam serves this function at the present time.

GARDEN GROVE

Although studies of the effects a 25-year flood (a flood of a magnitude that occurs on the average of every 25 years), a 100-year flood (a flood of magnitude that occurs on the average of every 100 years), and a standard project flood (200 to 500 year frequency) would have on Garden Grove are incomplete, present information compiled by the Army Corps of Engineers suggests that in the event of a 100-year flood, a significant portion of Garden Grove would be flooded to depths between 0.5 and 1.5 feet. In the event of a standard project flood, the entire city would be flooded. In order to minimize the damage from occurrences of this kind and to adequately drain the runoff from smaller storms, the Flood Control District and the City have built a number of flood control facilities in the city.

The Orange County Flood Control District owns and maintains facilities including Haster Retarding Basin (Twin Lakes Park), West Street Basin (Isaak Walton Pond) and several miles of flood control channels. The City owns and maintains an extensive system of storm drains and minor flood control channels which drain excess water into the District facilities. (See Map 4).

Objectives and Principles

At this time, according to Orange County Flood Control District officials, the flood control system in the county is designed to control a 25-year flood. The District now has the objective of developing a system that can handle a 100-year flood.

The City of Garden Grove has flood control objectives that are congruent with the objectives of the Flood Control District. According to the master plan of flood control and drainage adopted on January 16, 1972, the drainage system in the city "is designed to drain surface water up to the limits of anticipated flood water levels based on the overall flood control improvements constructed under the auspices of the Orange County Flood Control District". The City will follow the principle of providing a storm drain system which will prevent devastating flood damage and adequately dispose of rainfall and subsequent runoff from a ten-year frequency storm. The City will also attempt to relate its flood control system to the joint use concept whenever practical and financially feasible. Desirable joint use examples include:

- A. Utilization of land with flood hazard or flood control potential for recreational uses or open space.
- B. Maximum retention of storm runoff for recharging into the underground water basin for future use.
- C. Combine the construction of underground drainage facilities with street improvement projects to the full advantage of accuring economies.

Garden Grove should always follow the principle of attempting to relate Garden Grove's flood control system to regional, State and Federal plans and programs of comprehensive long-range planning for the total urban area to obtain the maximum benefits at the lowest possible cost to the community.

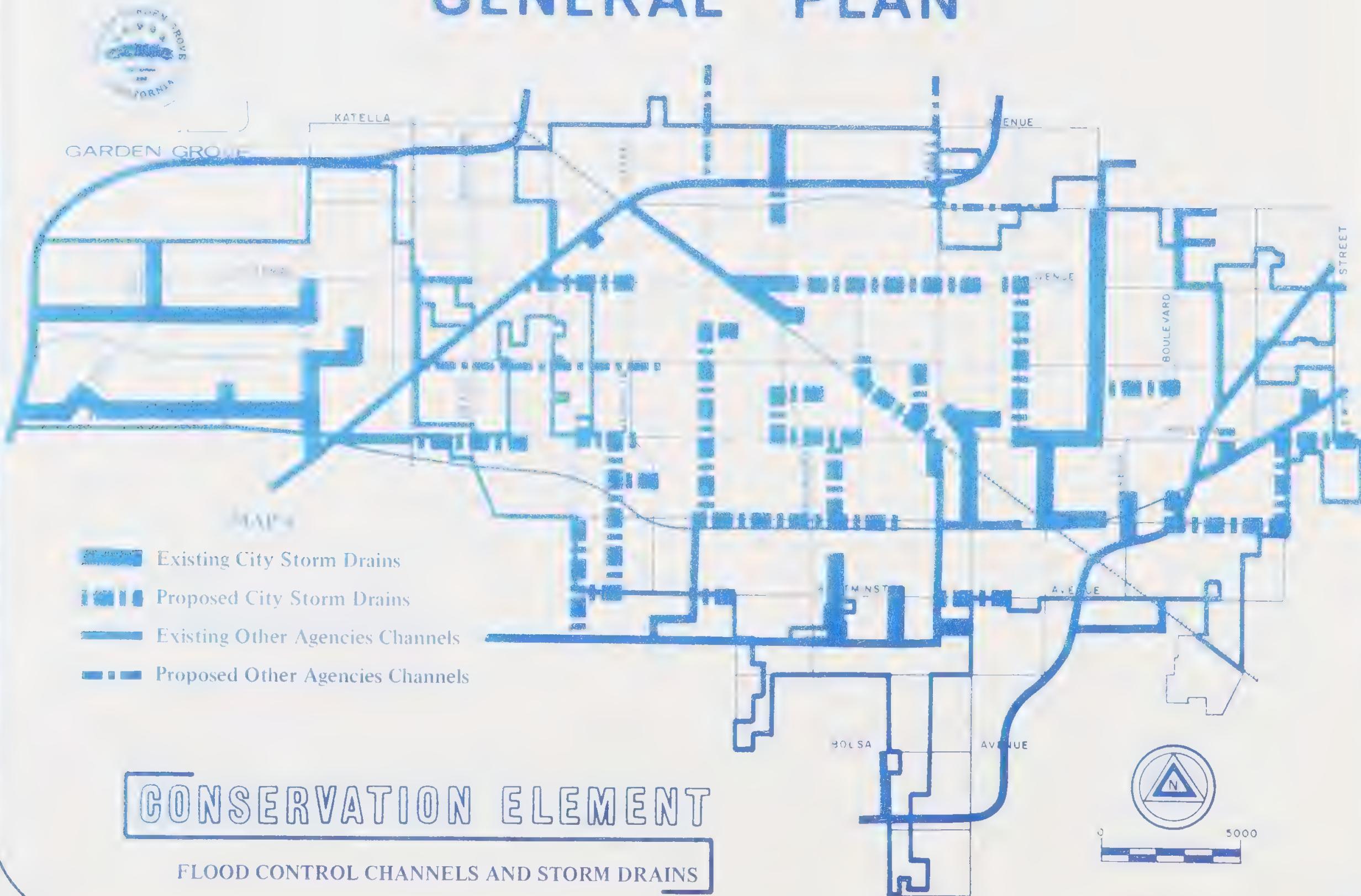
If all of the above principles are followed in developing a flood control system for Garden Grove, the City should be able to provide a quality service that will adequately protect and enhance the health, safety, and general welfare of its present and future citizens.

Future Facilities and Operations: The Region

The Orange County Flood Control District has no master plan for flood control facilities in the county. Facilities are planned on a short-term basis only. Nevertheless, even without a master plan, it is apparent that the District is a long way from meeting its primary goal of developing a flood control system that can handle almost any flood situation. According to district officials, "Most of the facilities existing now provide interim protection and will need future improvements". The main constraint is financial. By statute, the District is allowed to levy a maximum tax rate of \$.20 per \$100 assessed valuation on the property tax. The revenues from this tax rate are insufficient to provide for both maintenance and an aggressive building program.

Despite these problems, the Flood Control District will continue to increase the number of major channels and improve existing facilities such as levees on the Santa Ana River. (The latter project will be done in conjunction with the Army Corps of Engineers). It is also hoped that the Army Corps of Engineers will eventually replace Prado Dam with a stronger dam capable of controlling even the most serious flood situations.

GENERAL PLAN



Orange County Flood Control District facilities within the city are not up to standard, nor are they complete. It is not foreseen that facilities will be complete by the year 2000 based on present rates of construction. Major deficiencies exist around the Ninth Street area, along Trask Avenue, and in the area south of Chapman Avenue between Brookhurst Street and Magnolia Street. To remedy these situations the District has planned to construct a major facility in the Magnolia-Trask area as well as upgrading all major channels within the city. In addition, more minor storm collector drains are planned for various areas of the city. (Please refer to Map 4.)

In the past, the City has lagged in the development of local drainage facilities to supplement Flood Control District facilities. Recently, the City has taken an aggressive attitude towards utilizing federal revenue sharing funds for storm drain construction. Several projects have been completed, and several more are planned. As long as this trend continues, the City should make appreciable progress towards the fulfillment of its flood control responsibilities.



RECOMMENDATIONS

Most of the major actions involving water supply, water quality, sanitation, and flood control in the City of Garden Grove will be taken by public agencies other than the City. There are, however, several things that the City can do to maintain an adequate supply of water with sufficient quality and to safeguard its citizens against polluted water and flooding. These actions are listed below by category.

Water Supply

- A. Garden Grove should review through the environmental impact process, every proposed development in the city to be sure that the development will not overload the City's water supply system by using excessive amounts of water.
- B. Garden Grove should support any efforts by the Orange County Water District or the Metropolitan Water District to increase the quality of groundwater and imported water available to the region.

Water Quality

- A. Garden Grove should continue to supply its residents with water of the highest quality possible depending on economic conditions and the availability of supply.
- B. The City should continue its policy of drilling deeper wells to tap the purer groundwater basins.
- C. The City should support any efforts by the Orange County Water District, the Santa Ana Watershed Planning Agency, or any other agency, to improve water quality in the region and the city.

Sanitation

- A. Garden Grove should review through the environmental impact process, every proposed development in the City to be sure that a development will not overload the area's sanitation system by emitting excessive amounts of wastewater which exceeds the Orange County Sanitation Districts' permissible levels of effluent for certain kinds of waste.
- B. Garden Grove should support any efforts by the Orange County Sanitation Districts, the Garden Grove Sanitary District, and the Midway City Sanitary District to improve the sanitation system serving Garden Grove.
- C. Garden Grove should support any efforts by any business, industry or public agency to recycle wastewater and thus conserve our water resources.

Flood Control

The City has already taken action to implement the various interim flood control measures in order to qualify Garden Grove residents for federal flood insurance. However, these regulations and standards would be applied to the land, if necessary, only after the completion of the Flood Prone Study to be conducted by the Army Corps of Engineers. As listed in City Council Resolution No. 4344-72 adopted on December 19, 1972, these interim measures are:

- A. The City shall take into account those flood plain management programs, if any, already in effect in neighboring areas. Within resources made available, the City will cooperate with neighboring areas in efforts to control and

minimize damage to property from flooding in Garden Grove and adjacent areas.

- B. The City shall apply flood plain management programs to all areas identified by the Administrator of National Flood Insurance as flood plain areas having special flood hazards.
- C. The City shall ensure that, within any flood plain area of the city having special flood hazards, the laws and ordinances concerning land use and control and other measures designed to reduce flood losses shall take precedence over any conflicting laws, ordinance, or codes.
- D. The City shall require building permits for all proposed construction or other improvements in any designated flood plain area having special flood hazard.
- E. The City shall review building permit applications for major repairs within any future designated flood plain area having special flood hazard to determine that the proposed repair:
 - 1. uses construction materials and utility equipment that are resistant to flood damage, and
 - 2. uses construction methods and practices that will minimize flood damage.
- F. The City shall review building permit applications for new construction or substantial improvements within any future designated flood plain area having special flood hazards to assure that the proposed construction (including pre-fabricated and mobile homes) is:
 - 1. protected against flood damage,
 - 2. designed or modified and anchored,
 - 3. uses construction materials and utility equipment that are resistant to flood damage, and

4. uses construction methods and practices that will minimize flood damage.

G. The City shall review subdivision proposals and other proposed new developments to assure that:

- 1. all just proposals are consistent with the need to minimize flood damage,
- 2. all public utilities and facilities are located, elevated, and constructed to minimize or eliminate flood damage, and
- 3. adequate drainage is provided so as to reduce exposure to flood hazards.

H. The City shall require new or replacement water systems to be designed to minimize or eliminate infiltration of flood waters into the system and discharge from the system into flood waters and require on-site waste disposal systems to be located so as to avoid impairment of their operations or contamination from them during flooding. City shall cooperate with sanitary sewage systems providing sewage disposal facilities and services to the City in order that infiltration of flood waters into these systems and/or discharge of effluent into flood waters shall be minimized.

In addition to these measures:

- A. The City should continue to build flood control facilities, in accordance with its master plan of storm drains, which will supplement the facilities provided by the Orange County Flood Control District. The storm drains presently planned should be built as soon as possible and economically practical.
- B. The City should support any efforts by the Orange County Flood Control District to improve its facilities.
- C. The City should urge the Army Corps of Engineers to

improve its facilities, especially Prado Dam.

The City should have a definite plan of action to follow when flood danger is imminent in certain areas. This could be implemented by the police and fire departments with guidance from the development services department. According to the Hartford Insurance Company's publication "Flood Proofing: A Technique of Avoiding Flood Damage", a checklist of actions to take with regard to structures should include:

- 1 Close all openings, including doors, windows, and vents.
- 2 Waterproof and/or reinforce basement and foundation walls.
- 3 Reinforce or arrange for drainage of floor slab.
- 4 Anchor and reinforce floors and walls.
- 5 Use water resistant interior materials.
- 6 Valve-off or terminate utilities.
- 7 Arrange continuation of internal building systems.
- 8 Protect immovable equipment.
- 9 Remove stock, merchandise, or mobile equipment or material.
- 10 Reorganize space.
- 11 Implement flood-proofing procedures.



IMPLEMENTATION

To fully utilize the information and recommendations contained in this element, it should become an important tool in dealing with any matters related to conservation of the city's natural resources. For the Conservation Element to be used in this manner, it must be adopted as a statement of City Policy and must be monitored continually so as to make necessary revisions when circumstances require it.

Adoption of the Element

The first step in implementation of the Conservation Element is to provide it with official recognition. State law requires cities to adopt a Conservation Element of the General Plan. Therefore, after appropriate public hearings, the Conservation Element should be adopted to guide the City in any actions it might take relating to the conservation of its natural resources. Final adoption of the Conservation Element will incorporate it as a document of formal government policy along with the Growth Policy and other adopted elements of the General Plan.

Monitoring

As discussed in the Growth Policy Element, it is necessary to keep the General Plan elements consistent with the desires and

needs of the residents of the community. Whenever a modification is made to the Growth Policy or any other element, a review of possible impact on the Conservation Element should be undertaken.

To be sure that the Conservation Element is in conformity with the current needs and desires of the community, as well as with the goals and plans of other agencies concerned with the conservation of natural resources, it is recommended that annual review of the Conservation Element be performed by the City Urban Development Staff. A status report on this matter should be furnished annually to the Planning Commission and the City Council.

The City Staff should also monitor other City programs related to the Conservation Element to be sure that these programs are consistent with the policies and recommendations of the General Plan. Programs related to the Conservation Element that should be monitored include the City's Master Plan of Storm Drains and Water Department programs relating to water quantity and quality. The City's Capital Improvements Plan and Annual Budget should also be monitored to insure that sufficient funds have been allocated to finance programs and projects necessary for the implementation of the Conservation Element of the General Plan.



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